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(54) **Surface-modified semiconductive and metallic nanoparticles having enhanced dispersibility in aqueous media**

(57) Water-dispersible nanoparticles are prepared by applying a coating of a multiply amphipathic dispersant to the surface of a hydrophobic nanoparticle comprised of a semiconductive or metallic material. The multiply amphipathic dispersant has two or more hydrophobic regions and two or more hydrophilic regions, and is typically polymeric. Preferred polymeric dispersants are comprised of a hydrophobic backbone with hydrophilic branches, a hydrophilic backbone with hydrophobic

branches, or a backbone that may be either hydrophobic or hydrophilic, and substituted with both hydrophilic and hydrophobic branches. Monodisperse populations of water-dispersible nanoparticles are also provided, as are conjugates of the water-dispersible nanoparticles with affinity molecules such as peptides, oligonucleotides, and the like.

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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 3821

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 5 320276 A (NIPPON PAINT CO LTD) 3 December 1993 (1993-12-03) * paragraph [0014] - paragraph [0028] * * paragraph [0075] * * paragraph [0079] *	1-7, 12-15	INV. B01J2/00 H01L33/00 G01N33/58 C08F220/06 C08F220/56
A	US 5 970 381 A (OHNO HIROTAKA [JP] ET AL) 19 October 1999 (1999-10-19) * claim 1 *	1	
A	WO 00/17655 A (MASSACHUSETTS INSTITUTE OF TECHNOLOGY) 30 March 2000 (2000-03-30) * claims 1-37 *	1-7, 12-15	
A	US 6 048 616 A (RACZ JACQUELINE ET AL) 11 April 2000 (2000-04-11) * claims 1-14 *	1-7, 12-15	
X	WANG ET AL.: "Viscometric behaviour of hydrophobically modified poly(sodium acrylate)", POLYMER BULLETIN, vol. 20, 1988, pages 577-582, XP002676157, * page 578 - page 579 *	8-11	
A		4,5	TECHNICAL FIELDS SEARCHED (IPC) B01J H01L G01N C08F
The present search report has been drawn up for all claims			
Place of search Berlin		Date of completion of the search 18 May 2012	Examiner Cubas Alcaraz, Jose
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:
- ☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7, 12-15

Water-dispersible nanoparticle comprising an inner core and an outer layer comprised of a multiply amphipathic dispersant, as well as the method for preparing the nanoparticle.

2. claims: 8-11

Method for preparing a multiply amphipathic polymer.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-05-2012

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